3. Lake Operations/Maintenance Plan
Executive Summary

The Manual of Operations

The *Manual of Operations* is intended as a reference guide for the City and agency staff , administrative agencies, and the lake operators. It is also intended to be used as an academic and educational resource for the general public

One of the initial challenges in the preparation of the *Manual of Operations* was to develop a manual that is easily used, simple to access by a variety of users, contain a large amount of information, and is easily updated. The initial RFP issued by the City requested the *Manual* be provided in an electronic format on CD-ROM. Based on this initial concept, the EUS team proposed an Internet web-site. Although a non-traditional approach, this media provides the accessibility required when serving multiple users and organizations from various locations.

The *Manual of Operations* provides the City an easy tool to manage, update, and retrieve the information. The *Manual* provides information on operating equipment, process functions, water quality issues, emergency operations procedures, and serves as a library for permits, safety procedures, and inter-governmental agreements. To identify the hyperlinks between text files, words appearing in blue and/or underlined are links within the web site to additional information. The printed version of the *Manual* is a duplication of the web-site.

The *Manual* will be the single reference source for all questions and concerns related to the operation of Town Lake. It addresses not only the operations and maintenance of the dam and pumping systems, but also identifies water quality monitoring and maintenance procedures and the interrelationships between the various governing agencies, such as the City of Tempe, SRP, and ADEQ. Some issues have not yet been resolved and must be defined prior to the initial filling and operation of the lake. The operational requirements of the lake mechanical and ecological systems are described in the *Manual*, although unique operational issues unique may be discovered when the facility is placed into service.

The *Manual* is organized by the following operating features (Please refer to the attached Table of Contents for further description:

- Project Overview
- Dams & Lake Operation
- Lake Operating Systems
- Water Quality Monitoring
- Water Quality Management
- Upstream River Bed
- Agency Coordination Procedures
- Emergency Action Plan
- Appendix

The “Project Overview” section of the *Manual* provides a brief history and description of the project, along with the operational objectives in maintaining the Lake to meet the expectations of the City and private developers. The “Dam and Lake Operation” portion of the *Manual* addresses the direct operations of the dam’s mechanical components and the operation of the upstream and

downstream dams under various flow conditions. The operation of the dams is complex as each dam bladder can be independently inflated and deflated through both manual and automated systems. The operation of the bladder system at various lake levels and inflow conditions are described in this section.

The "Lake Operating Systems" portion of the *Manual* centers on the routine monitoring and maintenance necessary for the reliable day-to-day operation of the facility. This section focuses on the operation of the lake operating systems and the maintenance requirements of the mechanical support systems, i.e., dam overflow systems, seepage wells, and telemetry systems. Mechanical equipment components and systems are included, along with alarm and troubleshooting guides. The remote telemetry system alarms are identified and procedures described to provide the operator with an identification of the problem at hand. Pertinent equipment data such as pump curves, lubrication schedules, and troubleshooting guides will be included in this section of the *Manual*.

The "Water Quality Monitoring" and "Water Quality Management" sections of the *Manual* address the management of the lake's ecosystems. This includes the testing programs for the source water for the lake, along with ground water and storm water sampling programs to monitor the water sources. The management of the lake water quality may be the greatest challenge in the operation of the facility. These portions of the *Manual* focuses on operating strategies and scenarios such as removal of floating debris, emergent vegetation management, algae control, fish kill response, aeration and mixing, and chemical management. These sections provide reference information and the procedures established for lake water quality and groundwater depth sampling per ADEQ and the Federal Clean Water Act requirements. Also defined in this section are the various laboratory tests required to verify compliance with the County Health permit, laboratory analysis procedures, and operations documentation and reporting requirements.

Agency coordination and interaction procedures including the Emergency Action Plan in the event of severe flooding or dam failure are included in the *Manual of Operations*. Knowing what to do and when to do it is critical to the dependable (and profitable) operation of Town Lake. Cooperation between the staffs of the lake operator, City of Tempe, and other governmental agencies is necessary to operate the dams safely during flood conditions. The coordination and timing of changes to the inflatable dams and a lake evacuation plan must be coordinated with the City of Tempe, governmental agencies, and the private developments, vendors, and concessionaires along the shores of Town Lake.

The "Appendix" of the *Manual* contains the Dam Safety Operations and Maintenance Plan, along with the Dam Crack Monitoring plan, as required by the Arizona Department of Water Resources (ADWR). The appendix also contains safety procedures and requirements for personnel when performing maintenance on the various mechanical items within the facility.

History and Overview of the Project

The Rio Salado project began as a student design project in 1966 in the College of Architecture at Arizona State University. The concept, a linear park and green belt along a flowing Salt River, received considerable attention. In 1969, the Valley Forward Association and the Maricopa

Association of Governments (MAG) offered official backing to the project. In 1977, the Tempe Community Development Department prepared the original Rio Salado study for Tempe's portion of the river. In 1997, over thirty years past its original inception, construction began on the Rio Salado Town Lake.

The final design of the Tempe Rio Salado project encompasses an area from McClintock Drive to the Hohokam Expressway, and includes a variety of commercial, recreational, and residential developments. The centerpiece of the project, Town Lake is a 220-acre recreational lake in the normally dry Salt River bed, extending from about Hardy Drive east to the Indian Bend Wash. The lake is approximately 2½ miles long by 1,000 feet wide and ranges in depth from 19 feet at the downstream end to approximately 6 feet at the upstream end. The lake impoundment is formed by two Bridgestone inflatable rubber dam systems. The downstream dam consists of four, 16-foot-high inflatable bladders founded on a concrete and roller compacted concrete (RCC) foundation approximately 3 feet above the river grade. It was installed in four sections for a total length of 960 feet. There are three piers between the rubber dam sections and abutments at each end.

Lake Management Team

Bid items included the day-to-day operation of the rubber dams; operation and maintenance of the various lake operating systems; documentation to address the state's requirements for reporting water balance; testing of lake waters to ensure permit compliance; and management of the lake water quality. This process led to the selection of two project teams, working in conjunction with Tempe's staff, with the common goal of providing an aesthetically pleasing, recreational facility for the City. In February 1998 the City of Tempe issued a Request for Proposals for the operation of Tempe Town Lake.

The Salt River Project (SRP) was chosen to provide operation and maintenance services for the two dams and the lake operating systems. SRP also operates the Bureau of Reclamation lakes along the Verde and Salt River systems. SRP will also be responsible for the "water accounting" required by the state, which documents the quantities of water impounded in the lake, additional water supplied to maintain the lake level, seepage recovered and returned to the lake, and unrecoverable losses due to evaporation.

The Veolia Water team will provide expertise in water quality related issues. Working closely with SRP and City staff, the Veolia Water team will monitor the lake water quality, provide the laboratory testing and reporting necessary to document compliance with all permit requirements, implement chemical and/or biological treatments to meet esthetic parameters, make recommendations to operational procedures to improve water quality within the lake, and develop the *Manual of Operations* for Town Lake's operating systems.

A complete copy of the Town Lake Manual of Operations is on File in the City Clerk's office located at 31 East Fifth Street – Tempe, Arizona.